

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE
CHICAGO & NORTH WESTERN RY.

BOONE, IOWA

JANUARY 30, 1936

INVESTIGATION NO. 2037

SUMMARY

Railroad: Chicago and North Western
Date: January 30, 1936
Location: Boone, Iowa
Kind of accident: Side collision
Trains involved: Passenger : Freight
Train numbers: 15 : East-bound extra
Engine numbers: 1660 : 3021
Consist: 6 cars : 63 cars and caboose
Speed: 45 m.p.h. : 6 m.p.h.
Track: Tangent
Weather: Clear and cold
Time: 12:15 p.m.
Casualties: 9 injured
Cause: Apparently failure of engineman
to observe and obey stop indica-
tion of dwarf signal.

March 21, 1936.

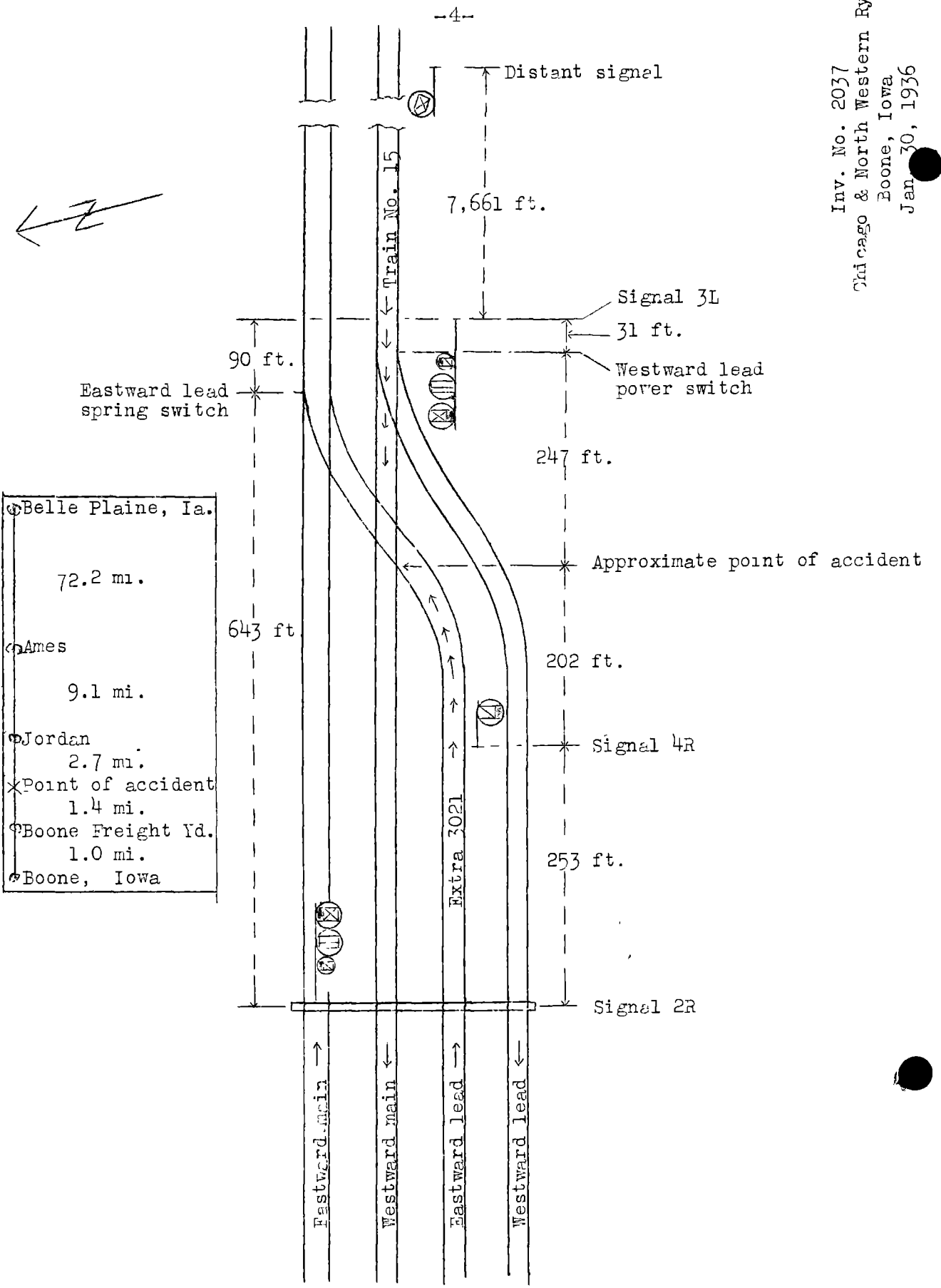
To the Commission:

On January 30, 1936, there was a side collision between a passenger train and a freight train on the Chicago and North Western Railway near Boone, Iowa, which resulted in the injury of 2 passengers, 4 dining-car employees, 1 Pullman employee, and 2 railway employees. This accident was investigated in conjunction with representatives of the Board of Railroad Commissioners of Iowa.

Location and method of operation

This accident occurred on Sub-division 2 of the Iowa Division, extending between Belle Plaine and Boone, Iowa, a distance of 86.4 miles; in the vicinity of the point of accident this is a double-track line over which trains are operated by time table, train orders, and an automatic block-signal system, supplemented by an automatic train-control system of the 2-speed, continuous-induction type, with 2-indication cab signals. The current of traffic is to the left. The yard at Boone is situated south of the main tracks, and two lead tracks extend eastward from the yard approximately 1 mile to BU interlocking, which is operated by remote-control apparatus from the interlocking tower at Eighth Street. Approaching BU all four tracks are parallel and are designated, beginning at the north, as the eastward main, westward main, eastward lead, and westward lead. The eastward lead crosses the westward main at an angle of 7°9', the accident occurring at the fouling point of these two tracks. Approaching this crossing from the east, the main track is tangent for more than 3,500 feet and the eastward lead track is tangent for a distance in excess of 2,000 feet; the grade for west-bound trains is 0.05 percent descending.

The interlocking tower at Eighth Street, and BU interlocking are located 3,035 and 12,524 feet, respectively, east of Boone. Through train movements and movements between the yard and main tracks are governed by color-light signals controlled from the tower. Movements on the eastward main, or to it from the yard, are made over a trailing-point spring switch; movements on the westward main, or from it to the yard, are made over a facing-point switch, electrically operated, controlled from the tower. Home signal 2R, which governs movements on the eastward main, is mounted on a signal bridge at a point 643 feet west of the spring switch and is a 3-unit signal; the top unit displays red, yellow, or green, for stop, approach, or proceed, respectively; the middle unit displays red at all times, and the bottom unit displays red or yellow for slow-speed movements with the block occupied. Home signal 3L, similar to signal 2R, governs



○ Belle Plaine, Ia.	72.2 mi.
○ Ames	9.1 mi.
○ Jordan	2.7 mi.
× Point of accident	1.4 mi.
○ Boone Freight Yd.	1.0 mi.
○ Boone, Iowa	

Inv. No. 2037
 Chicago & North Western Ry.
 Boone, Iowa
 Jan 30, 1936

movements on the westward main and is mounted on a mast located 31 feet east of the power switch and 273 feet east of the point of accident. A 3-indication distant signal is located 7,661 feet east of signal 3L. Signal 4R governs movements from the eastward lead to the eastward main and is a 2-indication dwarf signal placed to the right of the eastward lead at a point 253 feet east of the signal bridge and 202 feet west of the point of accident; this signal displays a red light for a stop indication and a yellow light for proceed at restricted speed. Additional dwarf signals are installed to govern other movements. All signals and the power-operated switch are controlled by means of a 4-unit table interlocker, which is located in the tower, and equipped with green lever-lights to indicate the position of the appliances which are being controlled. The levers are not interlocked, but the circuits are so arranged that no signal can display a clear indication until the switch is in the correct position and the track conditions are proper for the movement intended to be made.

Annunciators indicate the approach of trains on the main track and the eastward lead; the westward main track annunciator circuit begins 15,222 feet east of home signal 3L and the eastward lead track annunciator circuit extends 600 feet west of signal 4R. Approach and route locking are provided, so arranged that a definite time interval is imposed which prevents the changing of a route until the interval has elapsed. For the operation of the train-control system, alternating current is superimposed on the track circuits when the home signals are clear, but when these signals are not clear this energy is not imposed on the circuit between the distant and home signals and the cab signal indication of an approaching train changes from green to yellow at the distant signal and the train can then proceed only under the speed limit imposed by the device, which is $17\frac{1}{2}$ miles per hour. All movements from the yard to the main tracks are made with yellow cab-signal indications and within the imposed speed limitation; on the eastward lead, the cab signal can not change to green until the engine reaches the fouling point of the eastward main.

Signal 4R can display a yellow indication, authorizing a movement from the eastward lead across the westward main to the eastward main, only when the eastward home signal is at stop and the eastward main track is unoccupied east of the signal; in addition, the westward home signal must be either at stop or displaying a slow-speed indication on the bottom unit, and the switch leading from the westward main to the westward lead must be lined for a movement to the westward lead track. Normally, signal 4R does not change back to red until the train

on the eastward lead reaches the fouling point of the eastward main track.

Due to a strong west or northwest wind the view was considerably obscured by drifting snow and smoke from the engine of the freight train; the sky was clear and the temperature below zero at the time of the accident, which occurred at 12:15 p.m.

Description

Train No. 15, a west-bound passenger train, consisted of 1 baggage car, 1 express car, 1 mail car, 1 coach, 1 dining car, and 1 Pullman sleeping car, in the order named, all of steel construction, hauled by engine 1660, and was in charge of Conductor Morrison and Engineman Early. This train departed from Ames, the last open office, 14.2 miles east of Boone, at 11:52 a.m., according to the train sheet, 1 hour 27 minutes late, and was struck by Extra 3021 while passing through BU interlocking at a speed estimated to have been about 40 or 45 miles per hour.

Extra 3021, an east-bound freight train, consisted of 63 loaded cars and a caboose, hauled by engine 3021, and was in charge of Conductor Stensland and Engineman Leese. This train departed from the yard by way of the eastward lead at about 12 o'clock noon, passed dwarf signal 4R and collided with Train No. 15 at the crossing of the eastward lead and the westward main while moving at an estimated speed of 6 miles per hour.

Engine 3021 struck the south side of the first car of Train No. 15 and continued to strike the following cars of the train with increasing force. The engine and first three cars of that train remained coupled and were not derailed but the sides of the cars were scraped; the coach, separated from other cars at both ends, was derailed and stopped upright at a point about 360 feet west of the crossing; the dining car stopped on the eastward main, lying on its right side at a point 120 feet west of the point of collision, and was destroyed by fire, and the Pullman car stopped in an upright position with its forward end on the eastward main and the rear end on the crossing, slightly to the south of the westward main. Engine 3021 was considerably damaged but remained upright on the crossing, having moved but a very short distance after the collision occurred, and none of the freight cars was derailed. The railway employees injured were the conductor and a brakeman of Train No. 15.

Summary of evidence

Engineman Leese, of Extra 3021, stated that he coupled his engine to the train at about 11 a.m. and received the orders from Conductor Stensland, consisting of a register check on first-class trains as of 9:30 a.m. and a message to use 1 hour 30 minutes on Train No. 12, an east-bound train due to leave Boone Freight Yard at 10:58 a.m.; no mention was made of Train No. 15, which was due to pass at 10:51 a.m. He did not know at what time he left the yard, but when approaching BU, his watch showed the time as 12:10 p.m. In response to his inquiry, the fireman told him that eastward home signal 2R was at stop, whereupon he assumed that the train dispatcher wanted him to go ahead of Train No. 12 and he said that he expected the route to be lined for the cross-over movement. His train was moving about 6 miles per hour when nearing dwarf signal 4R and his view ahead was obscured by steam and smoke ahead and to the right of his engine; in order to reduce the amount of escaping steam, he closed the throttle and then saw that the dwarf signal was yellow, at which time his view was clear and unobstructed. He called the indication of the signal to Fireman Frondle and Brakeman Mathews, and in order to make sure, he again shut off and called the indication of the signal, after which he began to work steam. He said he continued to watch the signal, and when the engine cab was over it, he again called its indication as yellow and then heard Train No. 15 passing; he at once applied the brakes in emergency, just before the accident occurred. Engineman Leese further stated that when he first called the indication of signal 4R, the fireman acknowledged it but the brakeman said that he could not see anything, after which the brakeman got behind him and looked out of his window, and when he called the indication the second time, both the fireman and brakeman acknowledged it. The engineman also said that he was not confused as to which signal governed the movement he was making; he was familiar with the plant and its operation, and with the indication he saw displayed by signal 4R he could not account for the fact that Train No. 15 was able to use the westward main at unrestricted speed, nor could he account for the indication of signal 4R subsequent to the collision, at which time he examined it and saw that it was at stop.

Brakeman Mathews, of Extra 3021, stated that he was standing on the deck of the engine when he heard the engineman call signal 4R as displaying yellow, and he repeated the indication although he did not see it. He then stepped up beside the engineman, looked through the clear-vision window, and said he could not see anything, to which the engineman replied that the signal was yellow the last time he saw it. The brakeman then crossed over to the fireman's side and told the fireman he could not see

anything and about this time the engine man again called the signal as displaying yellow. Brakeman Mathews then crossed back to the engine man's side, put his head and shoulders out of the window behind the engine man, who also was looking out, and said that he was still unable to see anything. The brakeman once more crossed the cab to the left side, this being about the time Train No. 15 arrived and the collision occurred. Brakeman Mathews further stated that he had seen eastward home signal 2R at stop but that he did not see signal 4R until after the collision, at which time it also was at stop.

Fireman Frondle, of Extra 3021, stated that the train moved at very slow speed when leaving the yard and the view ahead was obscured by drifting smoke and steam; when on the eastward lead he had a clear view of eastward home signal 2R, and when Engine man Leese asked its indication, he and Brakeman Mathews replied that it was at stop, which indicated to him that signal 4R might be displaying yellow. The engine man closed the throttle for a time in the vicinity of the signal bridge and called the indication of signal 4R as yellow, and the fireman acknowledged it although he did not see the signal, the engine man then remarking that the dispatcher must want them to go ahead of Train No. 13. The brakeman asked the fireman if he could see anything, to which he replied that he could not, after which the brakeman went over to the engine man's side of the cab but the fireman did not know what took place there; however, he heard the engine man again call the signal as yellow, when quite close to it. Fireman Frondle further stated that he did not see the indication of signal 4R at any time but that he had every reason to believe that Engine man Leese had received an indication permitting the movement. Smoke and steam prevented him from seeing directly ahead and he did not see Train No. 15 until its engine passed him, at which time Engine man Leese applied the brakes in emergency, bringing the train to a stop after moving a distance of 20 or 25 feet. The statements of the other members of the crew of Extra 3021 added nothing of importance.

Engine man Early, of Train No. 15, stated that the distant and home signals approaching BU were displaying green or proceed and that he was passing the home signal at a speed of about 45 miles per hour when the cab signal changed from green to yellow and the horn of the train-control device commenced to sound. He acknowledged these signals with the lever and made a 15-pound brake-pipe reduction, and was about to make a further reduction when he became aware of a break in the train line and the train stopped without his knowing that there had been a collision. As he approached BU, Engine man Early had observed the train on the eastward lead but could not determine whether it was moving or standing.

Fireman Gray, of Train No. 15, did not see the indication of the distant signal on account of smoke, which was trailing down on his side of the engine, but he heard the engineman call the indication as clear. The view was good when approaching the home signal and he saw it displaying a green light and called the indication to the engineman when about 500 feet east of the signal, and he said he kept it in view until it was passed and was certain that it did not change; nevertheless, a change of cab-signal indications was received in the vicinity of the home signal, although he could not say as to the exact point. Fireman Gray also said that when approaching the plant he saw Extra 3021 on the eastward lead but could not tell whether it was moving or standing.

Telegrapher-leverman Olmstead, on duty in the tower at Eighth Street at the time of the accident, stated that he saw Extra 3021 depart from the yard between 12 o'clock noon and 12:05 p.m., at which time the route through BU was lined for the crossover movement. When Train No. 15 entered the annunciator circuit, however, at 12:04 p.m. or 12:05 p.m., he changed the route to clear the westward main and then made no further change prior to the time of the accident. Extra 3021 actuated the annunciator on the lead track, according to his record, at 12:12 p.m., at which time signal 4R was at stop. He explained that it would have been possible to change the route back so as to line the cross-over for Extra 3021, but with Train No. 15 on the circuit the operation of the time release, together with the operations required in reversing the power switch and signals, would consume about $2\frac{1}{2}$ minutes, and he said that this was the only means by which signal 4R could be caused to display a proceed indication under the conditions then existing. It also appeared from his statement that eastward home signal 2R had been in the stop position nearly 11 hours. Leverman Olmstead further stated that no false signal indications had been reported to him in the past nor had he experienced any trouble in the operation of the plant on the day of the accident.

Signal Supervisor Mansfield was on Train No. 15 when the accident occurred. He immediately made an inspection of the signals and switches at BU and found signal 4R in stop position, with all other signals also displaying proper indications. The track circuit was not shunted by the dining car lying on the eastward main track and the only damage to the plant was the breaking of the track circuits of one section. As soon as the rails were replaced, the track was bonded and all line-ups and signals were tested, and the plant was restored to service, after which all moves were checked for a period of 40 hours and no trouble developed. The signal supervisor further stated

that the signals and apparatus of the tower interlocker and BU plant were inspected by the signal maintainer on December 9, 10, and 12, 1935, this being the regular monthly inspection, and at this time all circuits tested clear of grounds and all relays tested properly.

Tests made by the Commission's inspectors developed that proceed signals could not be displayed simultaneously by signals 4R and 3L, and all attempts to secure such a display resulted in both signals displaying stop indications. Signal 4R could be cleared only when the power switch was lined for the westward lead, which conforms to the intention of the installation, and in which case no train control current was imposed on the westward main between the home and distant signals. The tests further developed that a period of 45 seconds was required to change the route from the eastward lead to the westward main, 23 seconds was required to reverse these routes when no train was on the westward main track annunciator circuit, and 2 minutes 15 seconds were required to make the latter change when the annunciator circuit was occupied. No defects or improper conditions were found and the apparatus was well maintained.

Discussion

Engineman Leese, of Extra 3021, said that before leaving the yard he received a message authorizing him to use 1 hour 30 minutes on the time of Train No. 12 and that Train No. 15 was not mentioned. When approaching BU interlocking at 12:10 p.m., moving via the eastward lead at a low rate of speed, he inquired of the fireman concerning the indication displayed by eastward home signal 2R, and when informed that it was in stop position he remarked that the dispatcher probably wanted them to go ahead of Train No. 12, which according to the message would leave Boone about 12:25 p.m. He then began to look for signal 4R, which governed his movement across the westward main to the eastward main, and he said he saw it displaying yellow, authorizing him to make the movement, and that the signal still was yellow when he looked at it on two subsequent occasions, and his first knowledge of anything wrong was when the engine of Train No. 15 passed him, just before the collision occurred.

In order to cause signal 4R to display a yellow indication it would have been necessary for signal 2R to be in stop position, the eastward main track to be unoccupied east of signal 2R, signal 3L to be either at stop or displaying a slow-speed indication, and the power switch lined for a movement from the westward main to the westward lead.

At the time of the accident signal 2R was at stop and the eastward main east of signal 2R was unoccupied, but the power switch was closed and signal 3L was displaying a proceed indication. These facts are fully established by the evidence of Leverman Olmstead and the engineman and fireman of Train No. 15, and by the further fact that Train No. 15 passed over the power switch in closed position immediately prior to the collision; under these conditions it was impossible for the leverman to cause signal 4R to display a yellow or proceed-at-restricted speed indication. Immediately after the accident signal 4R was found to be displaying a stop indication; engine 3031 did not reach the eastward main and the overturned dining car did not shunt the track circuit on the eastward main, which is required in normal operation in order automatically to change the indication of signal 4R from proceed to stop, and the movement of trains on the westward main would not cause this signal to go to stop. After the accident careful examination and test was made of the signal and interlocking apparatus but nothing wrong was found. Under these circumstances it is believed that signal 4R was displaying red, or stop, instead of yellow, for Extra 3031, and that this indication was not properly observed and obeyed by Engineman Leese. It is noted from the statement by Engineman Leese that when he learned signal 2R was at stop he assumed his train was to go ahead of Train No. 13 and that the route was lined for his train. While he called the indication of signal 4R as yellow, neither the head brakeman nor the fireman was able to see this signal through the steam, smoke and snow.

According to the statement of the engineman of Train No. 15, the first unusual occurrence as he approached the point of accident was the sounding of the horn of the automatic train-control device, in the vicinity of the home signal, which undoubtedly was the result of Extra 3031 fouling of the circuit. In this connection, however, considering the distance from signal 4R to the point of collision, about 202 feet, and the distance from signal 3L to the point of collision, 278 feet, it is apparent either that Extra 3031 was exceeding the estimated speed of 6 miles per hour, or that the cab signals changed on the engine of Train No. 15 at a point considerably east of the home signal.

Conclusion

It is believed that this accident was caused by the failure of Engineman Leese, of Extra 3031, properly to observe and obey the stop indication of signal 4R.

Respectfully submitted,

W. J. PATTERSON,
Director.